

What is claimed is:

1. A longitudinal magnetic field compacting method for manufacturing a rare earth magnet in the shape of a butterfly  
5 for use in VCM of HDD or DVD, a disk or coin for use in coreless motors, and a block for linear motors, comprising the following steps of:  
melting an alloy including 27-36wt% RE/59-73wt% Fe/0-5wt% TM/0-2wt% B by a vacuum induction heating  
10 process, to obtain a molten alloy, which is then subjected to a strip casting process or a chill mold casting process, to prepare an alloy ingot;  
hydrogenating the alloy ingot in a range of room temperature to 200°C to increase pulverizability of the  
15 alloy ingot;  
pulverizing the alloy ingot by means of a jet mill, an attritor mill, a ball mill or a vibration mill, to prepare rare earth powders having a particle size of 2-6  $\mu\text{m}$ ;  
20 applying a pulse magnetic field to the rare earth powders so that the rare earth powders are oriented in a direction of an applied magnetic field and subjected to a longitudinal magnetic field compacting, based on the principle that a magnetic material is attracted to  
25 a center of a magnetic field coil by the pulse

magnetic field, to form a compacted body;  
sintering the compacted body at 1000-1100°C in a vacuo or  
argon atmosphere, to prepare a sintered body; and  
heat-treating the sintered body at 400-900°C, thereby  
5 obtaining a rare earth magnet.

2. The method as defined in claim 1, wherein the  
pulverizing step is performed in a nitrogen atmosphere or an  
inert gas atmosphere so as to prevent magnetic properties of  
10 the rare earth magnet from reducing due to oxygen  
contamination.

3. The method as defined in claim 1, wherein the rare  
earth powders are packed in a metal mold to have a packing  
15 density of 2.0-4.0 g/cc, increasing the degree of orientation  
of the powders.

4. The method as defined in claim 1, wherein the  
magnetic field is alternately applied 1-10 times in the range  
20 of 30-70 kOe, increasing the degree of orientation of the  
powders.

5. The method as defined in claim 1, wherein a length of  
a magnetic material constituting upper and lower punching  
25 parts of a longitudinal magnetic field compacting device is

controlled 0-10 times depending on a powder-packing height, so as to change a compacting pressure in the pulse magnetic field of 30-70 kOe.

5           6. A longitudinal magnetic field compacting device, comprising:

- a nonmagnetic metal mold having a cavity with a predetermined shape for uniformly packing rare earth powders therein;
- 10       a magnetic field coil part for applying a pulse magnetic field several times to the nonmagnetic metal mold positioned in a central portion thereof so that the rare earth powders in the metal mold are aligned in a direction of an applied magnetic field;
- 15       an upper punching part and a lower punching part respectively made of a magnetic material and a nonmagnetic material and disposed to come into close contact with a top and a bottom of the nonmagnetic metal mold;
- 20       a nonmagnetic core disposed at a lower portion of the nonmagnetic metal mold;
- a buffering spring disposed at a lower portion of the lower punching part for fixing the position of the lower punching part after compacting;
- 25       an air compressor connected to each of a first air

cylinder mounted above the upper punching part, a  
second air cylinder mounted below the buffering  
spring, and third and fourth air cylinders mounted to  
both lower ends of the nonmagnetic metal mold, so that  
5 air is fed to each air cylinder to move the  
nonmagnetic metal mold; and  
a magnetizer connected to the magnetic field coil part  
for feeding a magnetic field power to the magnetic  
field coil part.

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